Volume three • Issue four *Fall 1995*

BiofuelsUPDATE

Report on U.S. Department of Energy Biofuels Technology

U.S. Ethanol Coalition Returns from Brazil Trade Mission

Participants of the Governor's Ethanol Coalition (GEC) trade mission to Brazil last September returned with new information on alcohol vehicle technology, air quality benefits, and possible export potential. "We wanted to identify where Brazil's experience is applicable to the U.S.," said Todd Sneller, Nebraska's Ethanol Board Administrator. "Technical and public policy initiatives evident in Brazil's ethanol program can serve as a model for Nebraska and other Midwestern states," he said.

Brazil began its ethanol program—called proalcool—in 1979, in an effort to use its sugar cane crops to decrease dependence on oil imports. Since then, air quality benefits have justified continuing the effort, according to many government representatives.

Most of Brazil's vehicles are fueled by 22% ethanol blends, and more than 4 million operate on 95% ethanol. Ten years ago, 96% of the cars sold in Brazil were made to run on alcohol. Today that statistic has reversed, and most vehicles run on 22% blends. Brazilian government representatives say the trend changed because the most popular models were not available in alcohol versions. A General Motors (GM) announcement, made while the GEC was there, could change that.

Brazil's Usina da Barar harvests cane for sugar and ethanol.

GM Brasil hosted a GEC visit at its test track and unveiled an alcohol Corso, its most popular vehicle in Brazil.

"Brazil is quite a way ahead in automotive technology," Sneller said. The Brazilian divisions of Ford, GM, and Volkswagen have had several generations of alcohol vehicles to optimize for the fuel. "We want to encourage U.S. auto manufacturers to look at their Brazilian divisions," he said.

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Congress Looks at Ethanol Incentives

Some congressional members tried to reduce or eliminate ethanol tax incentives this year, and others sought ways to increase production. "We must do more to reach the 2 billion gallons by the year 2000 goal," said Senator Richard Lugar (R-IN) in a hearing before the Senate Agriculture, Nutrition, and Forestry Committee last September.

A lift in the ethanol percentage cap on gasoline, more research to improve production, and voluntary pump labeling for gasoline that contains ethanol and its derivative, ethyl tertiary butyl ether, were proposed by U.S.

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Ethanol Provides a Net Energy Gain for the United States

Corn ethanol production creates 24% more energy than it uses, according to a recent study performed by the U.S. Department of Agriculture (USDA) and the Colorado School of Mines. Furthermore, ethanol can replace petroleum imports by a factor of 7 to 1 because it uses abundant domestic feedstocks such as natural gas, propane, and coal, reported USDA agricultural economist Hosein Shapouri at the *Second Annual Biomass Conference of the Americas* held in Portland, Oregon, last August.

The question of ethanol's true energy value has been addressed in numerous studies, which reported wide variations. "Studies using older data may tend to overestimate energy use because ethanol manufacturing and farm production technologies have become increasingly energy efficient over time," the USDA authors noted.

The study looked only at direct energy used in production, and relied on the 1991 Farm Costs Returns Survey. Researchers made their calculations using the 1991-1992 average corn yield of 122 bushels/acre. The net value of ethanol is greater when energy credits are allocated to basic coproducts such as corn gluten meal, feed, and corn oil, according to the study. It also found that the dry milling process, which accounts for about one-third of U.S. ethanol production, creates more energy than wet milling.

The net value of corn ethanol could improve even more as newer, more efficient plants come on-line, the study illustrates. A recently closed plant in South Bend, Ohio, was "one of the first plants built and probably went out of business because they were not as energy efficient as those today," said Shapouri. ❑

Figure 1 *Energy Value of Ethanol Production*

	Dry Mill	Wet Mill	Weighted Average
Total Btu Input	189,890	199,449	196,294
Total Btu Output	218,980	209,903	212,674
Petroleum Replacement Factor	7.24	7.02	7.09

**Source: "Estimating the Net Energy Value of Corn–Ethanol," USDA*

Study to Compare Merits of Diesel and Biodiesel

A "first of its kind" working group began a study that will estimate and compare the environmental and energy merits of biodiesel versus diesel as transportation fuels. The study, called a full fuel cycle analysis, will assess all activities required to produce, distribute, and use both fuels. Its most important product will be a computer model that can be easily used by decision makers of all types. The model will help businesses and government agencies to assess economic, environmental, and energy aspects of both fuels.

Biodiesel is a substitute for diesel and is made from plant oils and animal fats. Interest in the fuel is high among operators of diesel-fueled fleets because adding 20% biodiesel to #2 diesel enables them to comply with stricter emissions regulations without extensively modifying vehicles.

What makes the study a "first of its kind," explained John Sheehan, the National Renewable Energy Laboratory's (NREL) biodiesel project leader, is the diverse backgrounds of the group's partners. Members include the U.S. Department of Energy's Office of Alternative Fuels, U.S. Department of Agriculture's Office of Energy, the U.S. Environmental Protection Agency's Policy Office, the National Vehicle Emissions Test Laboratory, and the City of Chicago. Representation from the private sector includes the National Biodiesel Board (a biodiesel trade association) and Twin Rivers Technologies, Inc. (one of several U.S. companies poised to commercialize biodiesel in this country). Other companies and agencies, including ARCO Chemical and Canada's Department of Energy, have expressed interest in participating, according to Sheehan.

The group intends that the analysis study will help initiate ongoing efforts to stimulate the widespread commercial use of biodiesel. Biodiesel is currently produced in small U.S. markets for about $0.79/liter ($3.00/gallon)—usually from soybeans. According to Sheehan, technologies today produce the fuel from recycled fats and oils for about $0.38/liter ($1.45/gallon). One of the goals of long-term NREL research is to develop technologies that convert coal power plant flue gas into biodiesel using microalgae for $0.31/liter ($1.18/gallon) by 2015. ❑

Ethanol Incentives

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Department of Agriculture Secretary Daniel Glickman at the hearing.

The U.S. Environmental Protection Agency (EPA) limited the oxygenate content in gasoline to 2.7% by weight during the summer because of concerns that higher levels would increase nitrogen oxide emissions. "We have asked the National Academy of Sciences to review outstanding environmental questions of ethanol in the summer months," said EPA Administrator Carol Browner, who added that she expected they would finalize lifting the cap in 1996. The EPA has also called upon state governors for pump labeling to allow consumers to make choices. "We remain committed to exploring how to expand the market," she said.

Senator Tom Harkin (D-IA) also said he has directed his staff to look into oil industry subsidies. "We should give renewables a boost up just like they had 50 years ago."

Ethanol incentives continued to be a hot issue for Congress this fall. Representative Bill Archer (R-TX), chairman of the House Ways and Means Committee, proposed a bill that would have reduced the gasoline blender's $0.54/gallon ethanol tax exemption from the $0.184 cents/gallon imposed on gasoline sales. The provision was criticized in a letter to Archer signed by Senator Robert Dole (R-KS) and Senator Charles Grassley (R-IA), who wrote it would "dramatically change and reduce the federal program to promote the domestic production and use of fuel ethanol." They added: "The irony is that these proposals could actually increase federal expenditures."

The U.S. Treasury could lose $2.5 to $5.4 billion from 1996 through 2000 if the current tax incentives for ethanol are eliminated, according to a recent report by the General Accounting Office (GAO). Without the incentive, ethanol production would decline 50%-90%, according to most estimates, and thus reduce the demand for corn. Resulting farm program payment increases would outweigh the $2.5 billion increase in gasoline tax revenues, according to GAO.

Not only corn growers would be affected, the report noted. Growers of wheat, sorghum, barley, and other crops would also feel the market change. "Processing grain into ethanol adds value that ripples throughout the economy," said Merlin Plagge, president of the Iowa Farm Bureau.

In addition to the federal tax exemption, many states offer various ethanol incentives and tax-exempt financing. These are listed in Figure 3 below. For more information, call the state energy office.

For a copy of GAO's report "Ethanol Tax Exemption," call the GAO's Document Distribution Center at 202-512-4800 and request document number GAO/RCED-95-273R. ❑

Figure 2 *States With Ethanol Tax Incentives*

State	Ethanol Tax Incentives	Energy Office
AL	Federal tax credits can also apply to state liability	800-242-5320
AK	$0.08/ethanol gallon (blender)	907-269-7579
CA	E85 and M85 excise tax is half the gasoline tax	916-654-4989
CT	$0.01/ethanol gallon (blender)	860-418-6287
FL	County governments receive waste reduction credits for using yard trash, wood, or paper waste as feedstocks for fuel.	904-922-6086
HI	4% ethanol sales tax exemption	808-587-3809
ID	$0.21 excise tax exemption for ethanol or biodiesel	208-327-7910
IL	2% average state sales tax exemption	217-785-2800
IA	$0.01 (blender)	515-281-7018
KS	$0.20 (producer)	913-271-3170
MN	$0.02 (blender), $0.25 (producer)	612-296-5175
MO	$0.02 (blender), $0.20 (producer)	314-751-4000
MT	$0.30 (producer)	406-444-6697
NE	$0.20 (producer), $0.50 ETBE (producer)	402-471-2867
NC	Individual income and corporate tax credit of 20% for the construction of an ethanol plant using agricultural or forestry products; an additional 10% if the distillery is powered with alternative fuels.	919-733-2230
ND	$0.40 (producer)	701-328-2094
OH	$0.01 (blender)	614-466-6797
SD	$0.20 (blender), $0.20 (producer) Alternative fuels are taxed at $0.06/gal	605-334-0100
WY	$0.40 (producer)	307-777-7284

In addition to the federal tax deductions for the incremental cost of purchasing an alternative fuel vehicle, many states also offer alternative fuel vehicle tax incentives. For more information, call the National Alternative Fuels Hotline at 1-800-463-1DOE.

Figure 3 *Federal Excise Tax Exemption for Ethanol-Blended Fuels**

Ethanol Volume	Oxygen Content	Tax Exemption (cents/gal)
5.7	2.0	3.0
7.7	2.7	4.1
10	3.5	5.4

**Through Sept. 30, 2000*

Small Ethanol Producer Tax Credit

A $0.10/gallon tax credit for ethanol producers with a total capacity of no more than 30 million gallons/year.

Brazil Trade Commission *(continued from page 1)*

Brazil's experience shows that, when neat ethanol is run in an optimized vehicle, there are reductions in carbon monoxide, carbon dioxide, hydrocarbon, and nitrogen oxide emissions. "Ethanol from biomass appears to have an impressive potential as a mitigation option for global climate warming," said Plinio Nastari, president of Datagro, Ltd., in Sao Paulo.

During the trip, the GEC formed an alliance with Sao Paulo's government and the Alcohol and Sugar Producers Association. The alliance "will make Brazil's best air quality scientists available to us," Sneller said.

The GEC group also toured the world's largest cane-to-ethanol plant, which produces 79.25 million gallons of ethanol annually. Most Brazilian plants can produce both sugar and ethanol, so upswings in the sugar market can affect ethanol production; thus, Brazil imports much of its ethanol. This year, Brazil will import an estimated 5% of America's total ethanol production, according to the GEC.

Brazil may be restrained in its alcohol supply in upcoming months, and participants who represent the U.S. ethanol industry discussed possible transactions. ❑

Biofuels News Bites

- The Biomass Energy Alliance has a web site on the internet that contains the latest legislative information on biofuels: http://www.biomass.org/biomass. Led by former U.S. Department of Energy Principal Deputy Assistant Secretary for Conservation and Renewable Energy, Reid Detchon, the Alliance aims to expose the untapped potential of biomass energy for the rural economy and the environment. For more information, call 202-639-0384.

- 1992 and later Volkswagen owners in Europe can have their diesel vehicles converted by the auto manufacturer to run on rapeseed methyl ester (RME), Europe's most common form of biodiesel.

- Ten representatives from Amoco, Exxon, the Nebraska Ethanol Board, and the University of Montana have joined a new committee that will provide private industry and state government perspectives on research sponsored by the Terrestrial Biomass Feedstock Interface (TBFI) project. The TBFI committee will promote biofuels technologies, identify promising biomass feedstocks, and suggest possible locations for the first commercial biomass-to-ethanol conversion facilities. The committee, which met for the first time in June, is also seeking out companies, communities, and agencies that would like to participate in developing a local fuel production industry.

Biofuels UPDATE

NATIONAL ALTERNATIVE FUELS HOTLINE
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NREL/SP-425-20357 *Produced for the U.S. Department of Energy (DOE) by the National Renewable Energy Laboratory, a DOE national laboratory. For more information, contact the National Alternative Fuels Hotline at 1-800-423-1DOE.*